

ON A NEW CRUSTACEAN FOUND INHABITING THE
TUBES OF *VERMILIA* (SERPULIDÆ.)

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[PLATES XXXVI. and XXXVII.]

While examining a stone obtained from about low-water mark at Watson's Bay for living *Serpulæ*, I found inhabiting the tube of a *Vermilia* in several instances an Isopodous Crustacean which is in many respects very remarkable. In some points the animal shows relationships to known families of Isopoda—notably the Anthuridæ; but it has become to some extent specially modified in accordance with its peculiar mode of life. The body is narrow and vermiform, the telson and terminal appendages very wide, the other appendages very small; the sides of the body are ornamented with long setæ. The whole appearance of the animal is singularly like that of a small *Serpula*, the operculum and branchiæ being mimicked by the expanded posterior appendages and telson, and the hairs representing the parapodial setæ, while the smallness of the limbs and the vermiform shape of the body, aid in perfecting the resemblance. That the presence of these Crustaceans in the *Serpula*-tubes was not a mere accidental occurrence was shewn by the fact that the three which I first found, all of which were females, had each a brood of embryos with them in the tube, and not in any way connected with them. After finding those three in *Serpula*-tubes all quite near one another on the same stone, I found another on the surface of the stone. This I found to differ in several respects from the others, not possessing the long hairs, and being white instead of red; it is probable it had escaped from one of the tubes that was broken open. On another occasion I found in the same spot three more individuals of the same species, two of which were females like those I had previously found, while the third differed from them very remarkably in shape, being extremely elongated and filiform. Each of these, including the last, which I conclude to be a male,

was found in a separate tube. All of them seemed almost incapable of motion, the utmost movement to be observed being very feeble flexions and extensions of the limbs.

The embryos on examination showed two principal stages. In the first of these (pl. XXXVII., fig. 4) the ventral plate has become segmented, but there are no appendages; in the second (fig. 5) the appendages are all represented; the larva at this stage having very much the appearance of that of *Asellus*; and it is specially noteworthy that the flexure of the larva, as in the genus just named and other "normal" Isopoda, is towards the dorsal side. The dorsal organ (*d.*) is a small lobed body not projecting beyond the outer larval membrane. On either side of it is a remarkable jointed larval appendage (*e.*) arising from the middle of the lateral surface of the larva and directed outwards and dorsad. No similar appendages are known to exist in any other Edriophthalm; but whether they point to the former existence in the Edriophthalm larva of embryonic locomotive appendages of which the ordinary paired "dorsal organ" may be a still further reduced remnant, or whether they are simply developed for the attachment of the larva to the pinnate hairs of the abdomen of the female a further study of their structure and relations will be necessary to decide. They are still present in a rather later stage of development than that represented in figure 5, after the alimentary canal and hepatic lobes have become clearly distinguishable.

EISOETHISTOS VERMIFORMIS.

The general form of the body is narrow, almost cylindrical, with a slight amount of dorso-ventral compression. The head is very small, broader in front than behind, with prominent eyes, each with three or four bright red spots. The antennæ are very short, nearly equal in length, the upper pair with eight joints in the flagellum, the lower with six. In the female the first and the seventh segments of the thorax are the shortest, the former being not much larger than the head: the second, third, fourth and fifth are nearly equal in length, the sixth rather shorter. In breadth the segments gradually increase from before backwards, the first

being little broader than the head, the last nearly three times as broad. There are some slight differences between different individuals in the form and size of the segments, but they are too slight to require particularisation. In one female all the thoracic segments are densely bordered laterally with long pinnate hairs, in another hairs are almost entirely absent. The abdominal segments, though short, are distinctly separated from one another; the first and the last are larger than the others. The appendages of the last segment are on a type similar to those of *Anthura*, with a dorso-ventrally compressed peduncle, a ramus, which is serrated and obtusely pointed; and an appendage which is directly articulated with the posterior border of the segment. This appendage is a curved plate with a strong acute spine on its distal border, which is minutely serrated. The telson is a broad, somewhat quadrate structure with a serrated distal border. The arrangement of these parts is such that the caudal appendages and telson form an irregular shallow cup with the opening directed towards the dorsal side, and this forms a very efficient operculum for the closure of the tube. The abdominal appendages are very much like those of *Idotea*, the first pair forming a pair of valves closing over the rest, which are very delicate and membranaceous. All the thoracic appendages are very similar in character, none of them being subchelate. The first three pairs are turned forwards, the last four backwards; the posterior are rather the smaller, and have the spines less prominent, but otherwise there is little difference between them. The basal joint is narrow ovate, with a deep excavation at its distal end. The ischium is of similar shape but smaller, it bears externally a row of about twenty short conical spines and on its internal border a few small hairs. The meros is small, with four conical spines externally: the carpus is still smaller than the meros, with a row of minute spinules and a longer spine on its outer border. The propodos is longer than the meros and carpus together, nearly parallel-sided, with an oblique distal border: on its inner border is a row of minute spinules, with at the angle a stouter spine; towards the dorsal border are a few short spines. The dactylos is stout, with an acute accessory spine near its apex.

The male (pl. XXXVI., fig. 2) differs greatly in appearance from the female. It is extremely attenuated, the length being half an inch and the breadth only $\frac{1}{50}$ th of an inch, the thoracic segments being extremely elongated and slender. The limbs are very small and feeble, but are similar in structure to those of the female.

In the form of the body and of the pleonal appendages this curious genus presents a very marked approximation to the *Anthuride*; it is distinguished from these, however, not only by the anterior pereopoda being simple, but also, it would seem, by the position of the embryo in the egg, the flexure in the present form being towards the *dorsal* side, as in the "normal" Isopoda of Spence Bate and Westwood, whereas in the *Anthuride* the flexure of the embryo is towards the *ventral* side. I am inclined, however, especially as the development of so few of the *Anthuride* has been studied, to attribute less weight to the latter point, and am disposed to think that the structure of the appendages and the form of the body ally *Eisothistos* most nearly with the *Anthuride*, though with some points of resemblance to the *Egide*.

EXPLANATION OF THE PLATES.

PLATE 36.

- Fig. 1.—Female of *Eisothistos vermiformis*, x12.
 Fig. 2.—Male (?) of the same, x12.
 Fig. 3.—Posterior extremity of the same from above with the terminal appendages opened. *p*, ramus of posterior appendages; *t*, telson.
 Fig. 4.—Anterior antennæ.
 Fig. 5.—Posterior antennæ.
 Fig. 6.—Second pair of pereopoda.
 Fig. 7.—Apex of one of the more highly magnified.

PLATE 37.

- Fig. 1.—Posterior extremity from below. *t*, telson; *p*, ramus of posterior pleopoda; *p'*, appendage; *a*, anterior pleopoda.
 Fig. 2.—Dorsal plate of the first segment.
 Fig. 3.—Ventral plate of one of the middle segments.

Fig. 4. —Early stage in the development of the larva before the appearance of the larval appendages. *a*, outer larval membrane; *b*, inner larval membrane; *c*, blastoderm with indications of segments; *d*, yolk; *e*, rudiment of dorsal organ.

Fig. 5. —Later stage. *a*, outer membrane; *b*, inner membrane; *c*, yolk; *d*, dorsal organ; *e*, larval appendage; *f*, eye; *g*, and *h*, antennæ; *i*, pereopoda; *k*, pleopoda; *l*, telson.

NOTE ON THE YOUNG OF THE SAW-FISH SHARK (*PRISTIOPHORUS CIRRATUS*).

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About 18 months ago female specimens of *Pristiophorus* with young, were obtained with the trawl off Port Jackson. The young were fully formed, resembling the parent in everything except size, so that this peculiar genus of Sharks, like many others is viviparous. More recently I obtained from specimens received by the Australian Museum from the Fisheries Commissioners a series of fœtuses which exhibited a very much earlier stage of the development, the yolk-sac being still very large and the external gills being still conspicuous. In this stage the fœtuses (1) which were from seven to nine in number in each female, are particularly interesting from their possessing a rudimentary shell, which, though for the most part extremely delicate, presents at one point a spiral rudiment proving unmistakably its true nature. In one case this rudimentary shell was found detached and lying free in the cavity of the uterus. In the advanced stage first examined it had entirely disappeared. A similar rudimentary shell has been shewn to exist in several other viviparous genera, *Mustelus*, *Sphyrna* and others (1), but nothing has hitherto been known of the development of this peculiar Australian genus. On comparing the weights of the early stage *plus* the yolk sac, with the later stage, I found, as was to be expected from their relative size, that the latter was considerably

(1) See Balfour's Embryology, Vol. II.